

[10191/2234]

## SNAP RING

### Background Information

The present invention is directed to a snap ring according to the definition of the species in Claim 1. Snap retaining rings are already known which are used for axially securing structural components, such as bearings, gears, or sealing rings to shafts or bores. Snap rings of this kind can be designed to engage with radially inwardly open circumferential grooves, in bores, or with radially outwardly open circumferential grooves, in shafts. These snap rings exist in various removable and non-removable designs. They also constitute the subject matter of various standards (e.g., DIN, ISO). The snap rings are normally grooved with undersized and/or oversized dimensions, so that, once inserted into a corresponding circumferential groove, they are held by self-action in the shaft or bore, under prestressing.

### Summary of the Invention

The advantage of the snap ring according to the present invention having the features of Claim 1 is that, in addition to the axial retaining function, it also enables a centering action to be performed between a bore and a shaft or spindle to be inserted therein during assembly. In this manner, one can prevent a shaft sealing ring located between a bore and a shaft from becoming damaged, for example, by sharp edges or offsets during assembly due to the shaft and bore becoming skewed. Thus, one avoids a premature failure of the sealing action of the shaft sealing ring.

Advantageous further embodiments of the snap ring according to the present invention and improvements thereto are rendered possible by the measures delineated in the dependent claims.

### Brief Description of the Drawing

Two exemplary embodiments of the present invention are depicted in the drawing and are elucidated in the following description. Figure 1 shows a plan view of a snap ring according to the present invention, having a centering function in accordance with a first exemplary embodiment; Figure 2 illustrates a plan view of a snap ring according to the present invention, having a centering function in accordance with a second exemplary embodiment; and Figure 3 is a part-sectional view through a hammer drill, which has a snap ring according to the present invention, having a centering function.

### 15 Detailed Description

In Figure 1, 10 denotes a snap ring which has a concentrically disposed, slotted clip 11 of resilient material, in particular of spring steel. At its two free ends, clip 11 has lugs 12, 13, through each of which perforations 14, 15 are cut. As is generally known, into perforations 14, 15, one may insert snap ring pliers, which, by changing the distance between lugs 12, 13, make it possible to vary the diameter of clip 11 in order to install snap ring 10.

25 In Figure 1, snap ring 10 is designed as an internal ring for a radially inwardly open circumferential groove and is, therefore, suited for axially securing a component to a bore. Located inside clip 11 is a centering ring 17, which is joined 30 to clip 11 by way of a web 16. Centering ring 17 is provided with a center bore 18, which is disposed approximately concentrically to snap ring 10 and to a corresponding circumferential groove into which snap ring 10 is insertable. On the side of clip 11 facing opposite web 16, a notch 19 is 35 provided, which divides clip 11 into two limbs 11a, b. Limbs 11a, b are formed with a radial cross-section that tapers off toward the unattached ends, resulting in a uniform deformation

when snap ring 10 is installed. Located at each of the mutually opposing surfaces of lugs 12, 13 are flat portions 12a, 13a, which are used as mutual stop faces. In this context, flat portions 12a, 13a are aligned in parallel to 5 radial traces 36, 37, respectively, which run through a midpoint 35 of snap ring 10. The stop faces ensure that the material stress that clip 11 is subject to during installation of snap ring 10 is kept within acceptable limits.

10 Figure 2 illustrates a second exemplary embodiment of a snap ring 10 having a centering function. Equivalent parts and parts performing equivalent functions are denoted by the same reference numerals. In comparison to the exemplary embodiment according to Figure 1, the second exemplary embodiment 15 according to Figure 2 is distinguished by web 16 being located in the vicinity of a lug 12. In this context, centering ring 17 is likewise encircled by clip 11, so that snap ring 10 shown in Figure 2 is likewise designed as an internal ring.

20 Figure 3 depicts an application case for a snap ring 10 according to the present invention. Here, Figure 3 shows a partial section through a driving device 21 of a hammer drill. In the left half of the illustration of Figure 3, the driving device is shown in a final assembled position, while in the 25 right half, it is shown during assembly.

An electromotor 22 has a motor shaft 23, which is provided on the inside with an armature pinion 24. In this context, motor shaft 23 is rotationally mounted via an antifriction roller 30 bearing 25 at a gear housing 26. Seated next to and in front of antifriction bearing 25 in a through-hole 27 in gear housing 26 is a sealing ring 28, which, by way of its sealing lip 29, seals off a gear compartment 30 from a motor compartment 31. For that purpose, sealing lip 29 engages on 35 the outer surface of motor shaft 23 (left half of the illustration in Figure 3). Within through-hole 27, sealing ring 28 is axially secured by snap ring 10. In this context,

snap ring 10 is seated, under prestressing, in a concentrically disposed, internal groove 32 in gear housing 26.

5 In the right half of Figure 3, driving device 21 is shown in its assembled position. Here, antifriction bearing 25 is pressed onto motor shaft 23 and is installed, together with motor shaft 23 and electromotor 22, in through-hole 27. In so doing, armature pinion 24 initially reaches through centering bore 18 in centering ring 17, and is radially guided by the same. In response to further insertion of driving device 21, armature pinion then reaches through the sealing opening formed by sealing lips 29, deeper into bore 27, until it subsequently engages fully with gears 33, 34 in gear compartment 30, as shown in the left half of the illustration.  
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15 Centering ring 17, which, together with snap ring 10, forms one unit, prevents the sealing lip from being damaged by armature pinion 24, which may be sharp-edged, during insertion of driving device 21. To this end, centering bore 18 is designed to be approximately concentric to circumferential  
20 groove 32.

The present invention is not limited to the described exemplary embodiments. Thus, when working with a snap ring 25 designed as an external ring for shafts, it is also possible for the centering ring to wrap around the outside of the clip. In place of one web, a plurality of webs may also be provided for joining the centering ring and clip.